ANNALS, *AAPSS*, **545**, May 1996

The Social Amplification and Attenuation of Risk

By ROGER E. KASPERSON and JEANNE X. KASPERSON

ABSTRACT: Risk is a complex phenomenon that involves both biophysical attributes and social dimensions. Existing assessment and management approaches often fail to consider risk in its full complexity and its social context. The concept of the social amplification and attenuation of risk provides an approach that recognizes that how social institutions and structures process a risk will shape greatly its effects upon society and the responses of management institutions and people. Examples of both amplification and attenuation are provided from recent risk experience.

Roger E. Kasperson is professor of government and geography and senior researcher at the George Perkins Marsh Institute at Clark University.

Jeanne X. Kasperson is research associate professor and research librarian at the George Perkins Marsh Institute at Clark University and senior research associate at the World Hunger Program at Brown University.

THE generation and disposition of risk are surely emblematic of modern society. The familiar scourges of famine, disease, and pestilence no longer dominate the risk experience, which, instead, now involves negotiating a new and perplexing array of global threats associated with modern armaments, chemicals and radiation often invisible to the senses, contaminants whose effects surface only after decades or generations, hazards created by peoples and technologies in distant parts of the globe, and harms arising from the flow and control of information. In what the German social theorist Ulrich Beck has termed the "risk society,"[1] the elimination of risk has stolen center stage from the elimination of scarcity, which preoccupied industrial and preindustrial society.

The risk dilemmas and debates of the past several decades have arisen primarily from the poor fit between, on the one hand, assessment and management approaches fashioned by societal experiences with the risk problems of an earlier time and, on the other hand, the ongoing complexification of risk. Assessment procedures derived from the public health, toxicity, and engineering studies that have dominated the management programs of governments and corporations illuminate one portion of the risk complex while concealing others. Methodologies capable of addressing risk in its full modern complexity, it is clear, await creation and adoption. The concept of the social amplification and attenuation of risk seeks to advance this search for more comprehensive and integrative approaches.

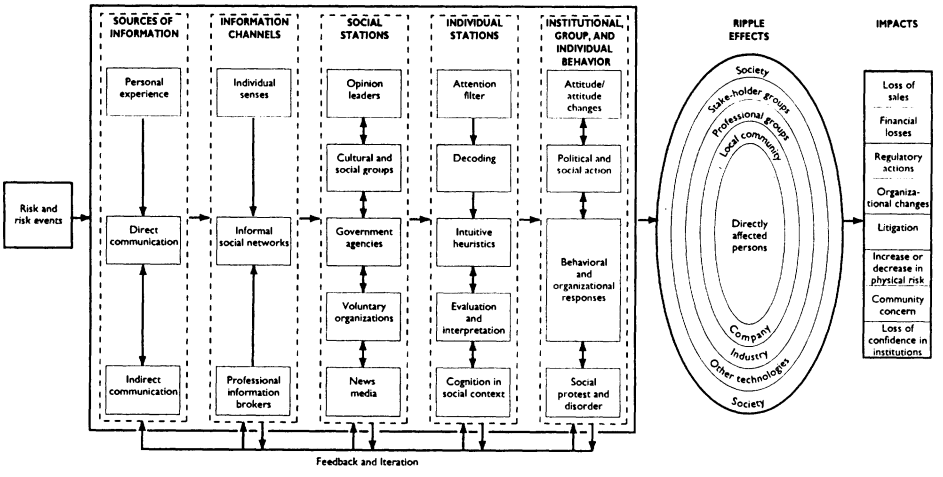
1. Ulrich Beck, *Risk Society: Toward a New Modernity* (Thousand Oaks, CA: Sage, 1992); idem, *Ecological Enlightenment: Essays on the Politics of the Risk Society* (Atlantic Highlands, NJ: Humanities Press, 1995).

THE SOCIAL AMPLIFICATION AND ATTENUATION OF RISK

In 1988, researchers at Clark University and Decision Research collaborated on a new framework for risk analysis, which they termed the "social amplification of risk."[2] This framework takes as its starting point that risks are interactive phenomena that involve both the biophysical and social worlds. Risk involves threats of harm to people and nature but also to other things or ends that people value, such as community or political freedom. As the joint product of impacts on human health and nature and perturbations in social systems and value structures, the human experience of risk is simultaneously an experience of potential harm and the ways by which institutions and people process and interpret these threats. These interpretations generate rules by which society and its subgroups should select, order, and explain signals concerning the threats emanating from human activities. Risk analysis, then, requires an approach that is capable of illuminating risk in its full complexity, is sensitive to the social settings in which risk occurs, and also recognizes that social interactions may either amplify or attenuate the signals to society about the risk.

2. Roger E. Kasperson et al., "The Social Amplification of Risk: A Conceptual Framework," *Risk Analysis*, 8(2):177-91 (June 1988).

FIGURE 1
SOCIAL AMPLIFICATION AND ATTENUATION OF RISK



As conceived in this framework (see Figure 1), social amplification or attenuation may occur in several ways. It may begin with a risk event, such as an industrial accident or a chemical release. It may emerge from the release of a government report that provides new information on the causes of airplane crashes. Alternatively, a public interest group that continually monitors the experiential world for hazard information relevant to its political agenda may issue a press release on a new health threat associated with a consumer product. Since most of society learns about the parade of risks and risk events through information systems rather than through direct personal experience, risk communicators, and especially the mass media, are major agents, or what we term social stations, of risk amplification and attenuation. Particularly important in shaping group and individual views of risk are the extent of media coverage; the volume of information provided; the ways in which the risk is framed; interpretations of messages concerning the risk; and the symbols, metaphors, and discourse enlisted in depicting and characterizing the risk.

The channels of communication are also important. Information about risk flows through multiple communication networks—the mass media represented by television and newsprint, the more specialized media of particular professions and interests (including, increasingly, Internet or the information superhighway), and, finally, the more informal personal networks of friends and neighbors on whom individuals continually rely as reference points for validating perceptions and contextualizing risk. Of these, most is known about the mass media, and particularly their multi-

ple and often conflicting roles as entertainers, risk watchdogs, gatekeepers, and agenda setters. It is also apparent that the mass media cover risks selectively, according those that are rare or dramatic—that is, that have "story value"—disproportionate coverage while downplaying, or attenuating, more commonplace but often more serious risks, such as smoking or aspects of lifestyle. Viewed somewhat differently, risk and risk events compete for scarce space in the media's coverage, and the outcome of this competition is a major determinant of whether a risk will be socially amplified or attenuated in society's processing and disposition of the risk.

Social institutions and organizations also occupy a primary role in society's handling of risk for it is in these contexts that most risks are conceptualized, identified, measured, and managed.[3] In postindustrial democracies, large organizations—multinational corporations, business associations, and government agencies—largely set the contexts and terms of society's debate about risks. These organizations vary greatly in their goals for and commitments to risk management. The President's Commission on the Accident at Three Mile Island, for example, concluded that the "mind set" that permeated the institutions charged with managing nuclear safety represented the primary problem in ensuring the safety of the nuclear technology used to produce electricity.[4] Freudenburg has implicated breakdowns in internal organizational communications as a contributor to the bureaucratic attenuation of risk, as occurred in the space shuttle *Challenger* accident, when the risk concerns of technical experts failed to reach top decision makers within the National Aeronautics and Space Administration.[5] Yet other studies[6] reveal that large corporations develop markedly different kinds of organizational cultures that shape powerfully their ability to identify and assess the risks of their activities and products and to determine if and how these risks will be communicated to other social institutions and publics. The behavior and interactions of institutions and organizations are major nodes of risk amplification and attenuation and require detailed attention in gauging how different societies respond to risk.

Risk issues are also important elements in the agenda of various social and political groups, such as nongovernmental organizations, with environmental and health concerns. The nature of these groups figures in the

3. James F. Short, Jr., "Defining, Explaining and Managing Risks," in *Organizations, Uncertainties, and Risk*, ed. James F. Short, Jr. and Lee Clarke (Boulder, CO: Westview Press, 1992), p. 4.

4. President's Commission on the Accident at Three Mile Island, *The Need for Change: The Legacy of TMI* (Washington, DC: Government Printing Office, 1979), pp. 8, 10.

5. William R. Freudenburg, "Nothing Recedes Like Success? Risk Analysis and the Organizational Amplification of Risk," *Risk: Issues in Health and Safety*, 3(1):13-14 (Winter 1992).

6. For example, Roger E. Kasperson and Jeanne X. Kasperson, "Hidden Hazards," in *Acceptable Evidence: Science and Values in Risk Management*, ed. Deborah G. Mayo and Rachelle D. Hollander (New York: Oxford University Press, 1991), pp. 9-28.

definition of risk problems, the type of rationality that attends interpretation, and the selection of management strategies. To the extent that risk becomes a central issue in a political campaign or a source of contention between social groups, it will be vigorously brought to greater public attention, often imbued with value-based interpretations. Polarization of views and escalation of rhetoric by partisans typically occur, and new recruits are drawn into the conflict. These social alignments about risk disputes often outlive a single controversy and become anchors for subsequent risk episodes. Indeed, they frequently remain steadfast even in the face of conflicting information.

The information system surrounding risk questions and the processing of risk by the various stations of amplification and attenuation transmit signals to society about the seriousness of the risk and the performance of risk management institutions. The degree of amplification or attenuation will affect the extent to which risk ripple effects accompany the risk or risk event. Where social concern and debate are intense, secondary and tertiary impacts on society beyond the people who are directly affected may occur, including such effects as

- enduring mental perceptions, images, and attitudes (for example, antitechnology attitudes, social apathy, or increased distrust of risk management institutions);
- impacts on the local or regional economy (for example, reduced business sales, declines in residential property values, and falling tourism);
- political and social pressures (for example, political demands and changes in political climate and culture);
- social and community conflict;
- changes in risk monitoring and regulation costs;
- increased liability and insurance costs; and
- repercussions for other technologies, products, or places (for example, lower levels of public acceptance) and for social institutions (for example, erosion of public trust and confidence).

The consequences of risk and risk events, then, often go well beyond the direct physical harm to human beings and ecosystems to include more indirect effects on the economy, social institutions, and well-being associated with amplification-driven impacts. Alternatively, a dampening and constraining of risk effects—a shrinking of impact ripples—may attend the attenuation of risk by social processes. Assessment methodologies must take account of the full range of risk consequences, as it frequently cannot be determined a priori whether the biophysical impacts customarily included in traditional risk assessment and characterization are the predominant adverse effects or whether they reside instead in the amplification-driven impacts and ripple effects.

Recent research has vividly illustrated the significance of risk in creating ripples and secondary impacts where the potential exists for stigma to become associated with certain technologies. Negative imagery and emotional reactions can become closely

associated with the mere thought of certain technologies, products, or places,[7] which become tainted objects to be shunned and avoided. The effects on public acceptance of a technology, its facilities and products, and the places in which it is located can be far-reaching. Nuclear energy and hazardous waste facilities are primary examples of stigmatized technologies or places now embroiled in controversy and public opposition. Biotechnology and chemicals also face some elements of such stigmatization. Contributing to such effects are the ingredients of the social amplification of risk—public perceptions of great risk, intense media coverage of even the most minor incidents or failures, distrust of the managers involved, social-group mobilization and opposition, conflicts over value issues, and disappointments with failed promises. In the modern risk society, amplification-driven impacts, such as stigma-related effects, appear to be marring and compromising the potential benefits to society from economic growth and technological change.

Although many cases are available with which to illustrate the processes of social amplification and attenuation of risk,[8] few events are more vivid than that which occurred at Goiânia, Brazil. That experience provides insight into the process of risk amplification and its potential to shape secondary consequences and ripple effects.

RISK AMPLIFICATION AND RIPPLE EFFECTS: THE GOIÂNIA EXPERIENCE

On 13 September 1987, two unemployed men in Goiânia, a city of 1 million in central Brazil, entered an abandoned clinic in search of scrap metal. They removed a stainless steel cylinder from a cancer-therapy machine and sold it to a junk dealer for about $25. An employee at the junkyard broke the cylinder and pried open a platinum capsule that contained cesium 137, a radioactive element. The crumbly cake of luminescent blue powder, described by witnesses as "carnival glitter," aroused curiosity, and pieces of it were passed around to family members and friends. Children playing in the junkyard spread the glowing material on their hands and bodies. One girl ate an egg sandwich with traces of the powder on her hands. The junkyard owner's wife slept in clothes dusted with the powder. Two weeks later, when Brazil's National Nuclear Energy Commission dispatched a response team, they found what was then the most serious radioactive accident to have occurred in the Western Hemisphere.[9]

The health consequences of the accident were serious. Of some 250 persons suspected to have been contaminated, 4 persons died within the first several months, 21 others required hospitalization, and one amputation

7. Robin Gregory, James Flynn, and Paul Slovic, "Technological Stigma," *American Scientist*, 83(3):220 (May-June 1995).

8. See the examples cited in Roger E. Kasperson, "The Social Amplification of Risk: Progress in Developing an Integrative Framework," in *Social Theories of Risk*, ed. Sheldon Krimsky and Dominic Golding (Westport, CT: Praeger, 1992), pp. 153-78.

9 For a thorough review of the accident, see *The Radiological Accident in Goiânia* (Vienna: International Atomic Energy Commission, 1988).

was required.[10] Eventually, seven major contaminated areas were identified in the city and isolated, and 42 residences were found to have been contaminated. Most of the other contaminated people, however, received relatively low radiation doses and the toll of the accident, albeit serious, has been exceeded by many other technological accidents, natural disasters, and acts of terrorism.

But the physical and health consequences of the accident were only part of a broader spectrum of effects that were ultimately to emerge from the social amplification of the accident.[11] Initially, the accident received only minor attention in a casual report in a local newspaper. But on 1 October, a highly sensational and lengthy São Paulo television broadcast initiated an intense period of dramatic and often exaggerated media coverage of the unfolding incidents and discoveries in the aftermath of the accident. Overnight, an army of reporters and camera crews descended on Goiânia to cover the tragedy. North American headlines spread the news of "deadly glitter," "a carnival of glittering poison," and "playing with radiation."[12] Extraordinary public concerns accompanied this media coverage, with perceptions of enormous risk apparent even among people with no contact with contaminated persons or materials.

The amplification of the event and the rippling of effects began almost immediately. Within the first weeks of the media coverage, more than 100,000 persons, of their own volition, stood in line to be monitored with Geiger counters for indication of external radiation. Within two weeks of the event, the wholesale value of agricultural production within Goiás, the Brazilian state in which Goiânia is located, had fallen by 50 percent, due to consumer concerns over possible contamination, even though no contamination was ever found in the products. Even eight months after the event, when prices had rebounded by about 90 percent, a significant adverse impact was still apparent. During the three months following the accident, the number and prices of homes sold or rented within the immediate vicinity of the accident plummeted. Hotel occupancy in Goiânia, normally near capacity at this time of year, had vacancy levels averaging about 40 percent in the six weeks following the São Paulo television broadcast, while the Hotel Castros, one of the largest in Goiânia, lost an estimated 1000 reservations as a direct consequence of risk perceptions and stigma. Interestingly, many people chose to forfeit

10. Constantine J. Maletskos, ed., *The Goiânia Radiation Accident*, special issue of *Health Physics*, 60(1) (Jan. 1991). Taken together, the articles in this special issue constitute an excellent analysis of the health effects.

11. The discussion that follows draws heavily on John S. Petterson, "Perception vs. Reality of Radiological Impact: The Goiânia Model," *Nuclear News*, 31(14):84-90 (Nov. 1988); John S. Petterson, "Goiânia Incident Case Study: Report on Follow-Up Study of Goiânia Incident" (Carson City: Nevada Nuclear Waste Project Office, 1988); Leslie Roberts, "Radiation Accident Grips Goiânia," *Science*, 20 Nov. 1987, pp. 1028-31; Bradley Graham, "Victims of Radiation Ostracized in Brazil," *Washington Post*, 8 Nov. 1987.

12. "Deadly Glitter," *Time*, 19 Oct. 1987, p. 38; Sam Seibert, "A Carnival of Glittering Poison," *Newsweek*, 19 Oct. 1987, p. 55; Augusta Dwyer, "Playing with Radiation," *MacLean's*, 2 Nov., 1987, p. 44; Christine Gorman, "A Battle Against Deadly Dust," *Time*, 16 Nov. 1987, p. 66.

deposits rather than risk a hotel stay in a contaminated location.

The effects of the social amplification of the accident rippled well beyond Goiânia itself as extensive stigmatization took hold. Caldas Novas, a hot-springs tourist attraction located a full one-hour drive from Goiânia, experienced a 30-40 percent drop in occupancy rates immediately following the São Paulo television broadcast. Hotels in other parts of Brazil refused to allow Goiânia residents to register. Some airline pilots refused to fly airplanes that had Goiânia residents aboard. Cars with Goiás license plates were stoned in other parts of Brazil. Even nuclear energy as a whole in Brazil was affected, as several political parties used the accident to mobilize against "nuclear weapons, power, or waste" and to introduce legislation designed to split the National Nuclear Energy Commission into separate divisions. Increased public opposition to nuclear energy was apparent throughout Brazil. The stigmatization of Goiânia resembled that which characteristically attends attempts to site nuclear waste facilities.[13] Even international ramifications of the accident have become apparent as Goiânia has become a frequent benchmark and rallying cry in antinuclear publications throughout the world.

The social amplification of risk as illustrated by Goiânia provides convincing testimony of the intertwining of physical and social phenomena in the makeup of risk and why society responds as it does to different types of risk. But risk attenuation is no less important or striking.

RISK ATTENUATION: THE ROOTS OF HIDDEN HAZARDS

By contrast with Goiânia, other risks, it is clear, pass unnoticed or unattended by society, growing in size until they exact a serious toll. Asbestos, for example, pervaded the American workplace and schools, although its respiratory dangers had been known for decades. Despite years of worry about nuclear war, the threat of a "nuclear winter" did not become apparent until the 1980s. The Sahel famine of 1983-84 passed unnoticed in the risk-filled newspapers of the world press until we could no longer ignore the specter of millions starving. A society with a Delaney amendment and a $10 billion Superfund program has simultaneously allowed smoking to become the killer of millions of Americans. The potential long-term ecological catastrophes associated with burning coal command far less concern from the mass media and publics than do the risks of nuclear power.

Could these neglects be simply the random risks or events that elude society's alerting and monitoring systems? After all, each society selects its worry beads, the particular risks that we choose to rub and polish assiduously while we relegate others to inattention.[14] Because our assess-

13. Paul Slovic, James Flynn, and Robin Gregory, "Stigma Happens: Social Problems in the Siting of Nuclear Waste Facilities," *Risk Analysis*, 14(5):773-77 (Oct. 1994).

14. Robert W. Kates, "Hazard Assessment: Art, Science, and Ideology," in *Perilous Progress: Managing the Hazards of Technology*, ed. Robert W. Kates, Christoph Hoheneinser, and Jeanne X. Kasperson (Boulder, CO: Westview Press, 1985), pp. 258-59.

ment and management resources are finite, some risks inevitably slip through and surface as surprises or outbreaks. Or are risks simply part of the overall allocation of good and bad in a global political economy, so that the incidence of risk events is only one of many expressions of underlying social and economic forces? Alternatively, are the hidden hazards simply those that are attenuated because they occur in distant times, distant places, or distant—that is, powerless or marginal—social groups?

Some risks are attenuated because they lie entangled in society's web of values and assumptions, which either denigrates the importance of the consequences or deems them acceptable, elevates the associated benefits, and idealizes certain related notions or beliefs. Since the advent of television, violence has been an intrinsic part of news and entertainment programs, including Saturday morning cartoons aimed at children. Several decades' effort to regulate televised violence has run aground on the shoals of the political power of the networks and the belief that violence is a part of American reality and that the protection of free speech should override the need to prevent antisocial behavior.

Handguns are a similar matter. Despite an extraordinary annual national toll from handgun-related violence and the assassination or attempted assassination of a succession of the nation's political leaders, control efforts, such as the Brady bill, have failed to overcome the credo that the right to bear arms is one of the most inalienable of American rights. A different case involves unemployment: the notion that unemployment arises from the failure of individuals rather than the shortfalls of a capitalist economic system accords this social risk a status very different from other risks to well-being. In European democracies, by comparison, social programs are enacted to correct the structural imperfections in the economy and to ensure that the victims of these imperfections can provide for basic needs.

The marginality of peoples, ecosystems, and regions is also an important source of risk attenuation. The Sudano-Sahelian drought of 1983 eventually emerged as one of the great environmental disasters of the twentieth century, yet it passed largely unnoticed by the world press, international organizations, and national development agencies until the famine reached its zenith during 1984.[15] Moreover, experts had predicted the prospect of continuing famine in the region for some time. As early as 1982, the United Nations Food and Agriculture Organization had issued alarming reports on the situation in Ethiopia. The Reagan administration, however, was clearly reluctant to deal with Marxist-Leninist regimes with whom its diplomatic relations were strained. The instability of governments, the political tensions, and the remoteness of the affected areas and fatalities also made it difficult to obtain accurate information. Within the U.S. government, policymakers debated whether the appropriate response should be humanitarian or political. Not until the

15. Paul Harrison and Robin Palmer, *News Out of Africa: Biafra and Band Aid* (Wolfboro, NH: Hilary Shipman, 1986).

NBC evening news aired a BBC special in October 1984 did the specter of emaciated, fly-ridden skeletons of starvation illuminate the scale of the calamity and trigger subsequent media coverage and public pressures that rendered a U.S. response to the disaster inescapable.[16]

An enduring media spotlight on the hollow eyes and distended bellies of starving children can command the attention and mobilize the flow of humanitarian aid from nongovernmental organizations and governments alike. The faces of famine, it seems, have news value. Not so a more unphotogenic epidemic, acquired immune deficiency syndrome (AIDS), which was a long while in capturing the attention of the media and the organizations that needed to manage the risk.[17] In the United States, the risks of AIDS were known in the early 1980s, yet years passed and the toll of infected persons mounted before the U.S. government belatedly took action. Doubtless, the marginality of the early victims and the taboo surrounding the transmission of the disease had much to do with its attenuation.

16. Lillian M. Li, "Famine and Famine Relief: Viewing Africa in the 1980s from China in the 1920s," in *Drought and Hunger in Africa: Denying Famine a Future*, ed. Michael H. Glantz (New York: Cambridge University Press, 1987), p. 415; Eleanor Singer and Phyllis M. Endreny, *Reporting on Risk: How the Mass Media Portray Accidents, Diseases, Disasters, and Other Hazards* (New York: Russell Sage Foundation, 1993), pp. 35-40.

17. James Kinsella, *Covering the Plague: AIDS and the American Media* (New Brunswick, NJ: Rutgers University Press, 1989); Charles Perrow and Mauro F. Guillén, *The AIDS Disaster: The Failure of Organizations in New York and the Nation* (New Haven, CT: Yale University Press, 1990).

The foregoing cases illustrate important contributors to risk attenuation and the phenomenon of hidden hazards: the margins are a low priority for a central authority, information flow and interaction with marginal groups are characteristically weak, ideological and political differences often underlie and accentuate distance in time and space, and the margins characteristically lack the power and resources to project the risk toll onto the national agenda or into vehicles of public scrutiny.

CONCLUSION

As modern society becomes increasingly preoccupied with eliminating risk, risk problems will more and more be the focus of society's microscope. In particular, assessment methodologies and risk management institutions will be called on to address risk in its full complexity and social context. But difficult risk issues, it is clear, are rarely about risk alone. Navigating the path toward alternative future societies and economies inevitably involves decisions about how society values the future, nature, and human well-being; the extent to which those most at risk should be protected; how risk reduction should best be balanced against economic gain and technological progress; and how much trust should be accorded to risk managers in a democratic society. As social structures and institutions process and resolve such matters, risk becomes transformed—it takes on added dimensions and new consequences, both beneficial and harmful, while the risk experience as a whole ac-

quires new subtleties and social meanings. The challenge to the risk society is the creation of political regimes and institutions capable of meeting rising public expectations for risk containment and reduction in the face of the growing pace and complexity of risk generation and the progressive intertwining of risk with deeper questions of ethics, the social ends of government, and democratic process.